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THE UNITED STATES OF AMERICA

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February 25, 2005

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APPLICATION NUMBER: ***60/541,412***
FILING DATE: ***February 02, 2004***

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

N. WOODSON
Certifying Officer

Practitioner's Docket No. 525-045-3 **PATENT**

Preliminary Classification:
Proposed Class:
Subclass:
NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P., § 601, 7th ed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Göran Sjönell

For: BLIND SPOT DETECTOR

Mail Stop Provisional Patent Application
Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

COVER SHEET FOR FILING PROVISIONAL APPLICATION (37 C.F.R. § 1.51(c)(1))

WARNING: *"A provisional application must also include the cover sheet required by § 1.51(c)(1) or a cover letter identifying the application as a provisional application. Otherwise, the application will be treated as an application filed under paragraph (b) [nonprovisional application] of this section." 37 C.F.R. § 1.53(c)(1). See also M.P.E.P. § 201.04(b), 6th ed., rev. 3.*

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NOTE: *"A complete provisional application does not require claims since no examination on the merits will be given to a provisional application. However, provisional applications may be filed with one or more claims as part of the application. Nevertheless, no additional claim fee or multiple dependent claims fee will be required in a provisional application." Notice of December 5, 1994, 59 Fed. Reg. 63,951, at 63,953.*

"Any claim filed with a provisional application will, of course, be considered part of the original provisional application disclosure." Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,209.

NOTE: *"A provisional application is not entitled to the right of priority under 35 U.S.C. 119 or 365(a) or § 1.55, or to the benefit of an earlier filing date under 35 U.S.C. 120, 121 or 365(c) or § 1.78 of any other application. No claim for priority under § 1.78(a)(3) may be made in a design application based on a provisional application. No request under § 1.293 for a statutory invention registration may be filed in a provisional application. The requirements of §§ 1.821 through 1.825 regarding application disclosures containing nucleotide and/or amino acid sequences are not mandatory for provisional applications." 37 C.F.R. § 1.53(c)(3).*

NOTE: *"No information disclosure statement may be filed in a provisional application." 37 C.F.R. § 1.51(d). "Any information disclosure statements filed in a provisional application would either be returned or disposed of at the convenience of the Office." Notice of December 5, 1994, 59 Fed. Reg. 63,591, at 63,594.*

NOTE: *"No amendment other than to make the provisional application comply with the patent statute and all applicable regulations may be made to the provisional application after the filing date of the provisional application." 37 C.F.R. § 1.53(c).*

NOTE: *35 U.S.C. 119(e)(1) requires that a nonprovisional application be filed within twelve months of the filing date of the provisional application for the nonprovisional application to claim the benefit of the filing date of the provisional application. Under 35 U.S.C. 21(b) and 119(e)(3), if this twelve-month period expires on a non-business day, it is extended to expire on the next business day.*

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 C.F.R. § 1.51(c)(1)(i).

1. The following comprises the information required by 37 C.F.R. § 1.51(c)(1):

2. The name(s) of the inventor(s) is/are (37 C.F.R. § 1.51(c)(1)(ii)):

NOTE: *"If the correct inventor or inventors are not named on filing a provisional application without a cover sheet under § 1.15(c)(1), the later submission of a cover sheet under § 1.15(c)(1) during the pendency of the application will act to correct the earlier identification of inventorship." 37 C.F.R. § 1.48(f)(2).*

NOTE: *"The naming of inventors for obtaining a filing date for a provisional application is the same as for other applications. A provisional application filed with the inventors identified as 'Jones et al.' will not be accorded a filing date earlier than the date upon which the name of each inventor is supplied unless a petition with the fee set forth in § 1.17(i) is filed which sets forth the reasons the delay in supplying the names should be excused. Administrative oversight is an acceptable reason. It should be noted that for a 35 U.S.C. 111(a) application to be entitled to claim the benefit of the filing date of a provisional application the 35 U.S.C. 111(a)[,] application must have at least one inventor in common with the provisional application." Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,209.*

The term "invention" is typically used to refer to subject matter which applicant is claiming in his/her application. Because claims are not required in a provisional application, it would not be appropriate to reference joint inventors as those who have made a contribution to the "invention" disclosed in the provisional application. If the "invention" has not been determined in the provisional application because no claims have been presented, then the name(s) of those person(s) who have made a contribution to the subject matter disclosed in the provisional application should be submitted. Section 1.45(c) states that "if multiple inventors are named in a provisional application, each named inventor must have made a contribution, individually or jointly, to the subject matter disclosed in the provisional application." All that § 1.45(c) requires is that if someone is named as an inventor, that person must have made a contribution to the subject matter disclosed in the provisional application. When applicant has determined what the invention is by the filing of the 35 U.S.C. 111(a) application, that is the time when the correct inventors must be named. The 35 U.S.C. 111a) application must have an inventor in common with the provisional application in order for the 35 U.S.C. 111(a) application to be entitled to claim the benefit of the provisional application under 35 U.S.C. 119(e). Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,208.

See 37 C.F.R. § 1.53.

	GIVEN NAME	MIDDLE INITIAL OR NAME	FAMILY (OR LAST) NAME
1.	Göran		Sjönell
2.			
3.			

3. Residence address(es) of the inventor(s), as numbered above (37 C.F.R. § 1.51(c)(1)(iii)):
   1. Askrikevägen 11, Lidingo, Sweden SE-181 46
   2.
   3.

4. The title of the invention is (37 C.F.R. § 1.51(c)(1)(iv)):
   BLIND SPOT DETECTOR

5. The name, registration, customer and telephone numbers of the practitioner *(if applicable)* is (37 C.F.R. § 1.51(c)(1)(v)):
   Name of practitioner: K. Bradford Adolphson
   Reg. No. 30,927 Tel. (203) 261-1234
   Customer No. 4955

   (complete the following, if applicable)

   ☐ A power of attorney accompanies this cover sheet.

6. The docket number used to identify this application is (37 C.F.R. § 1.51(c)(1)(vi)):
   Docket No.: 525-045-3

7. The correspondence address for this application is (37 C.F.R. § 1.51(c)(1)(vii)):
   Ware, Fressola, Van der Sluys & Adolphson LLP, 7555Main Street, P.O. Box 224, Monroe, CCT 06468

8. Statement as to whether invention was made by an agency of the U.S. Government or under contract with an agency of the U.S. Government.
   (37 C.F.R. § 1.51(c)(1)(viii))

This invention was made by an agency of the United States Government, or under contract with an agency of the United States Government.

☒ No.

☐ Yes.
The name of the U.S. Government agency and the Government contract number are:

9. Identification of documents accompanying this cover sheet:

A. Documents required by 37 C.F.R. §§ 1.51(c)(2)–(3):

Specification: No. of pages 41

Drawings: No. of sheets 1

B. Additional documents:

☒ Claims: No. of claims 18

Note: See 37 C.F.R. § 1.51.

☐ Power of attorney

☐ Small entity assertion

☐ Assignment

☐ English language translation of non-English provisional application

NOTE: A provisional application which is filed in a language other than English, does not have to have an English language translation. See 37 C.F.R. § 1.52(d)(2). However, if the provisional application is not in the English language and will later serve as a benefit of its filing date for a nonprovisional application, other than a design patent, or for an international application designating the U.S., then an English language translation must be filed in the provisional application or the later filed nonprovisional application. See § 1.78(a)(5)(iv).

☐ This application is in a language other than English and an English translation along with a statement of its accuracy is submitted herewith.

☐ Other

10. Fee

The filing fee for this provisional application, as set in 37 C.F.R. § 1.16(k), is $160.00, for other than a small entity, and $80.00, for a small entity.

☒ Applicant is a small entity.

*NOTE: "A. . . statement in compliance with existing § 1.27 is required to be filed in **each** provisional application in which it is desired to pay reduced fees." Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,197.*

11. Small entity assertion

☐ The assertion that this is a filing by a small entity under 37 C.F.R. § 1.27(c)(1) is attached. ("ASSERTION OF SMALL ENTITY STATUS")

☒ Small entity status is asserted for this application by payment of the small entity filing fee under § 1.16(k). 37 C.F.R. § 1.27(c)(3).

12. Fee payment

☒ Fee payment in the amount of $ 80.00 is being made at this time.

☐ No filing fee is to be paid at this time. (This and the surcharge required by 37 C.F.R. 1.16(l) can be paid subsequently).

13. Method of fee payment

☒ Attached is a ☒ check ☐ money order in the amount of $ 80.00

☐ Authorization is hereby made to charge the amount of $ _____

☐ to Deposit Account No. _____

☐ to Credit card as shown on the attached credit card information authorization form PTO-2038.

WARNING: *Credit card information should **not** be included on this form as it may become public.*

☒ Charge any additional fees required by this paper or credit any overpayment ~~in the manner authorized above~~ to Deposit Account No. 23-0442.

A duplicate of this paper is attached.

Date: _____

Tel.: ( )

Signature of submitter

OR

Signature of practitioner

Date: 2/2/2004

Reg. No.: 30,927

Tel.: (203) 261-1234

Customer No.: 4955

K. Bradford Adolphson

Ware, Fressola, Van der Sluys & Adolphson LLP

(type or print name of practitioner)

Bradford Green, Bldg. 5, 755 Main Street

P.O. Address

P.O. Box 224, Monroe, CT 06468

PATENT
Attorney Docket No.
525-045-3

U.S. PROVISIONAL APPLICATION OF

GÖRAN SJÖNELL

FOR

BLIND SPOT DETECTOR

Express Mail No. EV393301352US

Blind spot detector

The following description describes the functioning of the prototype blind spot detector of the present invention. It is appreciated that the present description concerns one possible embodiment of the invention out of many, claimed by the claims that are attached or to be formed in a future regular patent application. Further functioning could be added to those mentioned bellow.

The circuit drawing comprising blocks 1-5, attached to the present description is marked as Fig. 1. In the Fig. 1 blocks 1-5, within broken lines, are depicting one possible embodiment of the functioning of the blind spot detector.

Block 1 (Power supply)

The comprised voltage, in this case 12 V, but vehicle voltages systems such as 6 V, 24V and other possible can be utilized in further embodiments of the present invention, is converted to 5 V, whereby a number of filters provide a constant voltage of 5 V. It is necessary in this embodiment that an infra red-IR-system is provided a constant voltage of 5 V so that the functionality is not jeopardized by variations in voltage.

Block 2 (unit regulating IR-transmission)

Block 2 depicts a unit utilized to regulate (control) of the emission from IR-LED's depending on external light conditions. By blazing sunshine a strong signal is utilized and during darkness a weaker signal. This unit provides that the signal strength is adapted to the external light conditions. This also means that if the LED's become dirty the blind spot detector can regulate/adapt the signal strength to such conditions in one embodiment of the present invention.

Block 3 (Transmitting unit; Note that there are two Block 3 in the Fig. 6)

Multiple pairs of LED's could be utilized depending on the number of search fields in the blind spot area. For example, one search field can have a distance for searching of 2-4 meters, another, a distance of 4-8 meters and so on.

Additionally, in one embodiment, these search fields can be arranged so that warning signals are provided wh n a vehicle is entering the blind spot area, is within the area, and is leaving the area.

The width of the search field is determined by the optics of the LED's utilized, through the sector angle within a beam of light and the angle between beams of light, and through the power of transmission of a transmitted IR signal.

Block 4 (microprocessor)

The microprocessor controls the transmission and reception of light, and the following functioning:

1. A sequence of transmissions of IR signals. The signals are transmitted in sequences alternating between a right and to the left positioned LED. If both signals provide a return/reflected signal to the receiver an object such as a vehicle is determined as present behind the point where the transmitted signals intersect/cross, i.e., the blind spot area. The sequencing of signals makes it possible to position a return signal from an object or vehicle, as one of the signals has to confirm the other signal to provide a warning signal.
2. The microprocessor determines whether or not a received signal should trigger a warning. In order to trigger a warning signal, both the confirming signals/light beams must be reflected by the same object. Hence, the microprocessor is sorting out all fake/false positive signals/beams, i.e., return signals to the receiver, which are not confirmed by an intersecting or crossing signal.
3. The functioning of the microprocessor can be multiplied to a number of pairs of LED's and by programming the microprocessor the sequencing of the multiple search fields can be determined.
4. Also provided in the microprocessor, there are functions such as an interface/connection to direction indicators, speed of the vehicle, wheel angle of the vehicle and other functions to optimize the functionality of the blind spot detector warning device of the present invention.

Advantages of the present invention

1. Reduced number of or no fake/false positive warnings of blind spot objects.
2. The components utilized in the detector have a life span that widely exceeds the life span of a vehicle. For example a LED conventionally has a life span of 100.000 hours. A car that is driven 30.000 km on a yearly basis with a mean speed value of 70 km/h has to reach 70 years of age before vital components of the detector fail.

3. There is little risk for hazardous behavior.
4. The invention is built up of standard components, thus being very economic in manufacturing.
5. Very small dimensions and very simple to be attached, for example, in the housing of a vehicle rear view mirror.
6. The basic technique is the same for any kind of vehicle. Only the optics have to be adjusted/adapted to the vehicle outer dimensions and its dead spot, respectively, for different models of vehicles.

1 SYSTEM'S BLOCK DESCRIPTION

The circuit is divided in some blocks depending on the function of each part. First it will be explained the general function of the complete circuit, and after we see each block with more detail.

The system consists in the emission of a signal by two emitters and the detection of this signals by one photodetector, and if the detection that provide of two emitters is OK, then it will be activated the different alarms signals. This is the main object of this circuit. To do all this functions we have needed two microprocessors, one is the master and the other only does the emissions protocol and sends the signal to the emitter's blocks.

Now we are going to explain each block separately and with more detail:

1.1 BLOCK 1: Regulator

This block gives the stable voltage to all the circuit and it filters all the discontinuities that can be in the alimentation. The main component of this block is the regulator that transforms the 12V voltage of the battery in 5V to all the others integrated circuits (IC's) of the system. The other components are the filter capacitors and the inductance.

In the definitive version this block will be the same that now.

1.2 BLOCK 2: Control module (µC's and logic)

This block controls all the system. There are two microprocessors and the logic to enable the emitters.

The first µC (the biggest) is the main and it is who take all the decisions: here is where is generated the sequence to emit and is selected which emitter is on. This µC also has

to check the sequence that it receive from the detector and if it is OK, will active the different alarms depending on which nables inputs were on.
The other μC (PIC16C54) only has to read the sequence that the main μC sends and transform it in the correct protocol to send to the emitters.

This is the module that will change more in the definitive version: all the functions will be integrated in one μC, the emission protocol and the logic to enable or disable the emitters will be in the main μC. With this we can reduce two components and the consequent price will be cheaper than before.

1.3 BLOCK 3: Receiver module

The receiver module is the more sensitive part of the system and it has to be well isolated and protected against interference. The main component is the infrared receiver U2538 of Temic and the photodector, which detects the infrared light that the emitters send and converts it into electronic input signals. This device set the emission protocol by it characteristics and functioning.

In the definitive version this block will be the same that now.

1.4 BLOCK 4: Emitter modules

This block consists in two infrared drivers (U426 of Temic) with their respective infrared LED's. The drivers convert the voltage to the correct intensity to activate the LED's.

In the definitive version the emitter's module will change because the infrared driver devices are expensive and this function can do with cheaper components like are a transistor and a resistance (current source). The functioning is the same that the infrared driver device.

1.5 BLOCK 5: Enabl and alarms signals module

Here th µC check the enable inputs and if it is necessary active the outputs of the alarms to warn the driver. There are two inputs (enabl signals) and three outputs (alarm signals).

In the definitive version this block will not change.

2 PROTOCOL OF EMISSION

3 BEHAVIOUR OF THE D.A.D. ON ROUTE

The sensor is activated when starts the car. Once it is activated, warns the driver of the presence of some object or another car in the danger area by a *WARNING* signal as a light source signal: to indicate the driver that exists an obstacle in that area. This light will be in a place visible by the driver (control panel). There are another signal (*DANGER* signal) to warns the driver that it will be an acoustic signal: this alarm is activated when the electronics control system detects any displacement towards the direction of the obstacle detected or the intention to do it.

The enable signals of the DANGER alarm can be the following:

- the turn signals enable to indicate the intention to change the lane,
- the wheel steering or
- a combination of both.

It also can exist a third enables input that activa the system above some pre-programmed velocity.

3.1 *Turn signal enable*

3.1.1 Advantages

3.1.1.1 *In general*

- In ways of three or more lanes (in the city or fast ways), the system will only detect the vehicles in the adjacent lanes, but not the vehicles which are driving in the third or more lanes.

3.1.1.2 *Driving in the city*

- In the streets with two or more lanes, when the driver show the intention to do a lanes change with the turn signal on, the *DANGER* alarm is enabled immediately after that the *WARNING* signal is activated.
- In the squares with more than one lane, the driver will be warned with the DANGER alarm when he indicates the intention to leave the square, once it has detected one vehicle in the danger area.
- In urban ways there are quite bicycles and motorcycle among the cars, with this system it is possible to detect them and then avoid the collisions between both vehicles.

3.1.1.3 *Fast ways (motorways, railcars and roads with two or more lanes by direction).*

- When a vehicle drives into a motorway, and if the turn signal is activated, the sensor detects any obstacle in the dead angle area, so the driver can avoid turning back his head in order to see the incoming traffic.

3.1.2 Disadvantages.

3.1.2.1 *Fast ways.*

3.1.2.2 *Roads*

- The system goes into an alarm state when the driver switch on the turn signal indicator to advance the preceding vehicle and is passed by another vehicle in the other direction.
    - **Solution:** the system has a delay of 0,5 seconds to activate the *DANGER* signal. (two vehicles driving in opposite directions with an absolute velocity of 60 Km/h, spend approximately 0.15 seconds to cover 5 meters (just right the dead angle zone).

3.1.2.3 *City*

- Driving in a city, in narrow streets with or without stopped cars on both sides, the DANGER signal will be activated when turning to left and right.

    - **Solution:** The system shall be activated whit the speed of the car, being completely inactive under a low speed.

3.2 *Wheel steering enable.*

3.2.1 Advantages

3.2.1.1 *In general*

- The system is on when the driver turn the wheel steering colum, even though he forgets to switch on the turn signal indicator.

3.2.2 Disadvantages

3.2.2.1 *In general*

There are several added disadvantages

- The object in the blind spot area is detected when the action has begun, decreasing the reaction time to stop the movement.
- Driving in a Square or in a curve will activate always the detection system.

3.3 *Turn signal & wheel enable.*

Thi is the best solution because the system has three levels of DANGER signal. The first one is activated when switching on the turn signal indicator, the second one is enabled when turning the wheel, and the last one is enabled when both previous actions are taken.
It has the same advantages and disadvantages of both previous systems, and a Warning/Danger signal will be always activated.

3.4 *Recommended system*

FICOSA has several configurations depending on the number of inputs of the system.

3.4.1 OPTION 1-SECURITY

Inputs:

- Turn signal
- Wheel turn
- Velocity

Outputs:

- *WARNING signal*
- *DANGER 1 signal*
- *DANGER 2 signal*

3.4.1.1 *Functioning.*

The *WARNING* signal is always activated when an object is placed in the blind spot area.

Speed < 60 km/h:

Set on the DANGER signal when:

- 1st level: to indicate the intention of changing the lane.
- 2nd level: when the action is taken turning the wheel less than 30°, independently of the turn signal indicator if the speed is over 15 Km/h.

The DANGER signal will not be activated if the wheel is turned more than 20° (turning into a crossing street).

Speed > 60 Km/h

Set on the DANGER signal when:

- 1st level: when the turn signal is switched on

- 2nd level: when turning the wheel.

The WARNING signal will be on for at least 0.5 seconds.

3.4.2 OPTION 2-COST

Input:

- Turn signal
- Velocity

Outputs:

- *WARNING signal*
- *DANGER* 1signal
- *DANGER* 2 signal

3.4.2.1 *Funchoning.*

The *WARNING* is on when an object is detected in the blind spot area.

Speed <=15 Km/h

DANGER signal will be always off

Speed >15 Km/h and 60 Km/h

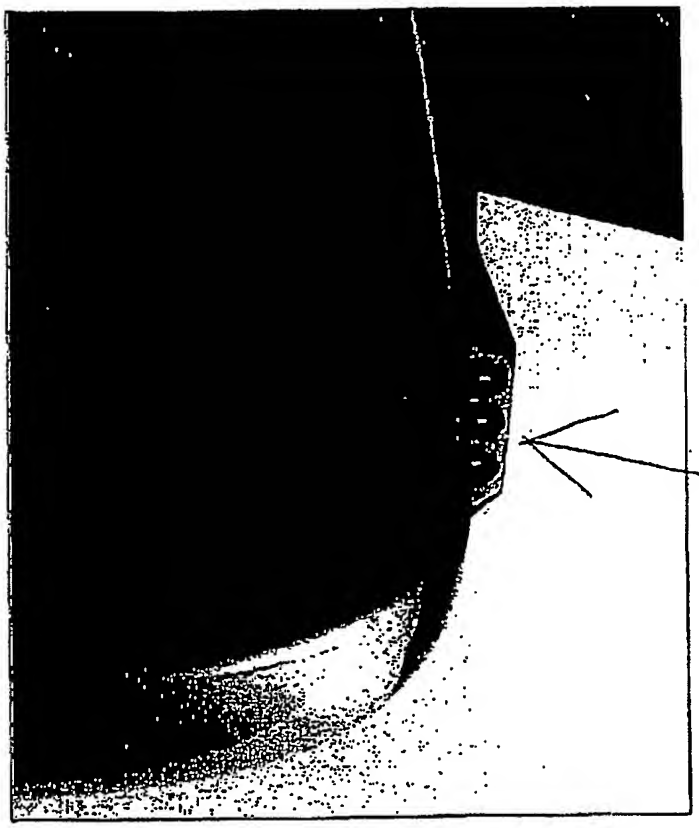
DANGER signal enable.

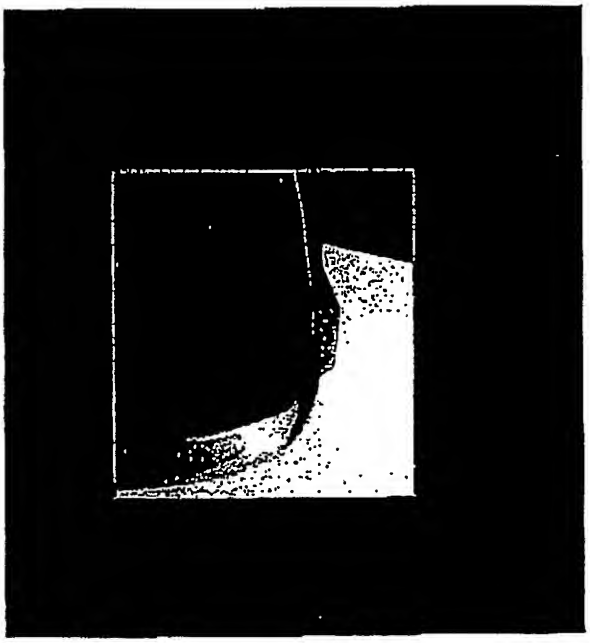
- 1st level: to indicate the intention of changing the lane with the turn signal on and the speed is less than 30 Km/h (change of direction and a possible presence of motorbikes, but also can be vehicles parked).
- 2nd level: when indicate the intention of changing the lane with the turn signal on and the speed is over 30 Km/h (change of direction or lane in wide roads).

Speed > 60 Km/h

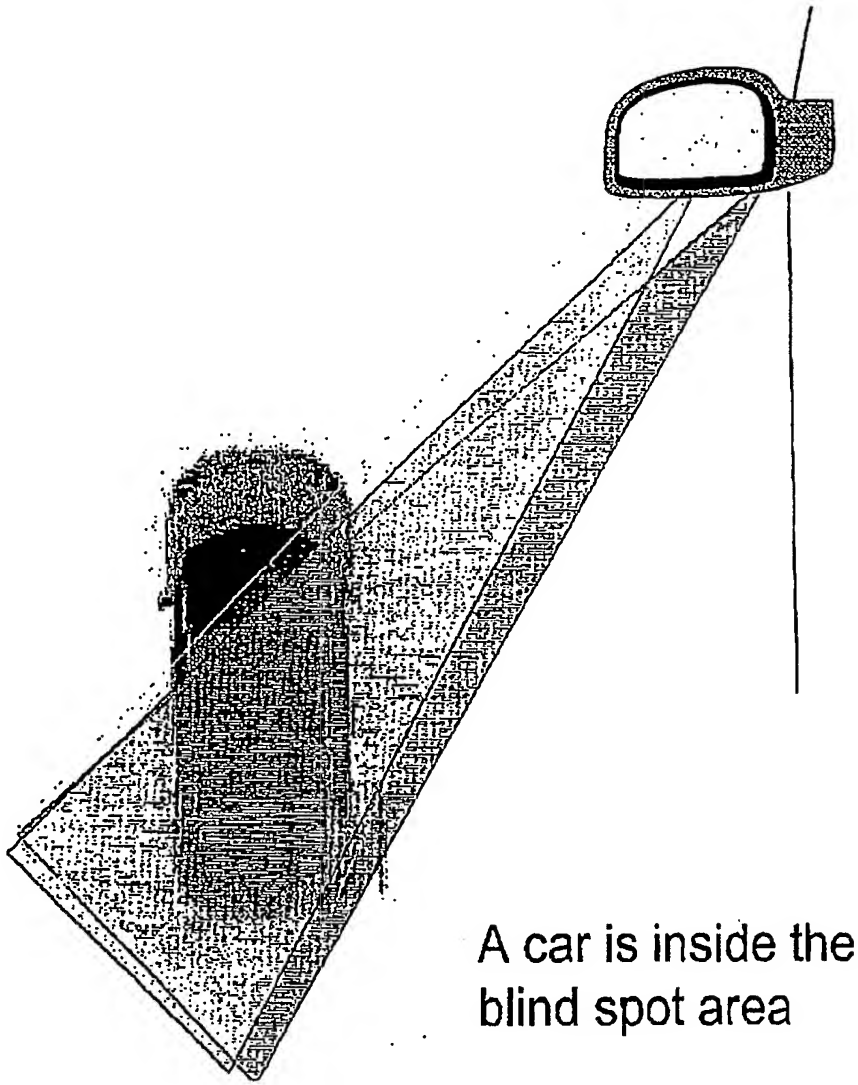
- 2nd level: to indicate the intention of changing the lane with the turn signal on.

INFRARED BLIND SPOT DETECTOR





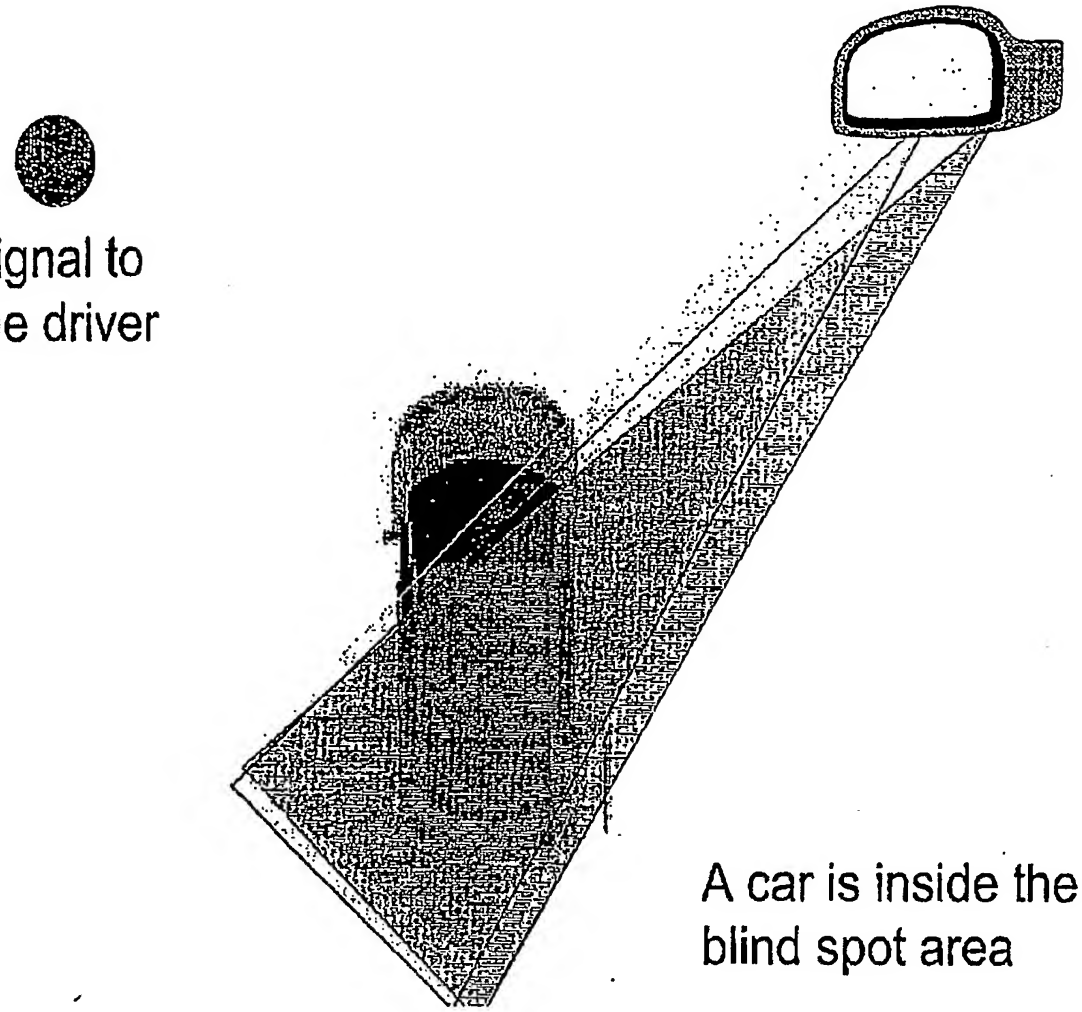
Infrared Sensor working



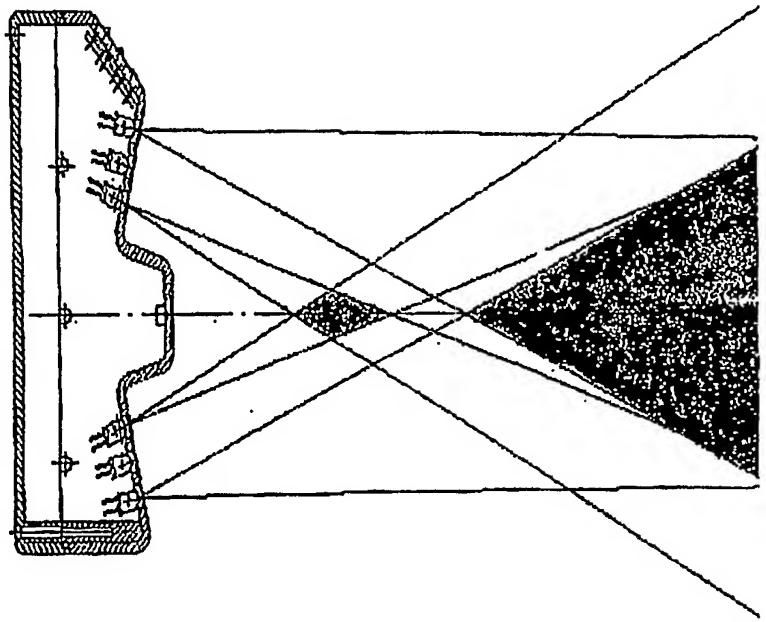
Signal to
The driver

A car is inside the
blind spot area

Infrared Sensor working

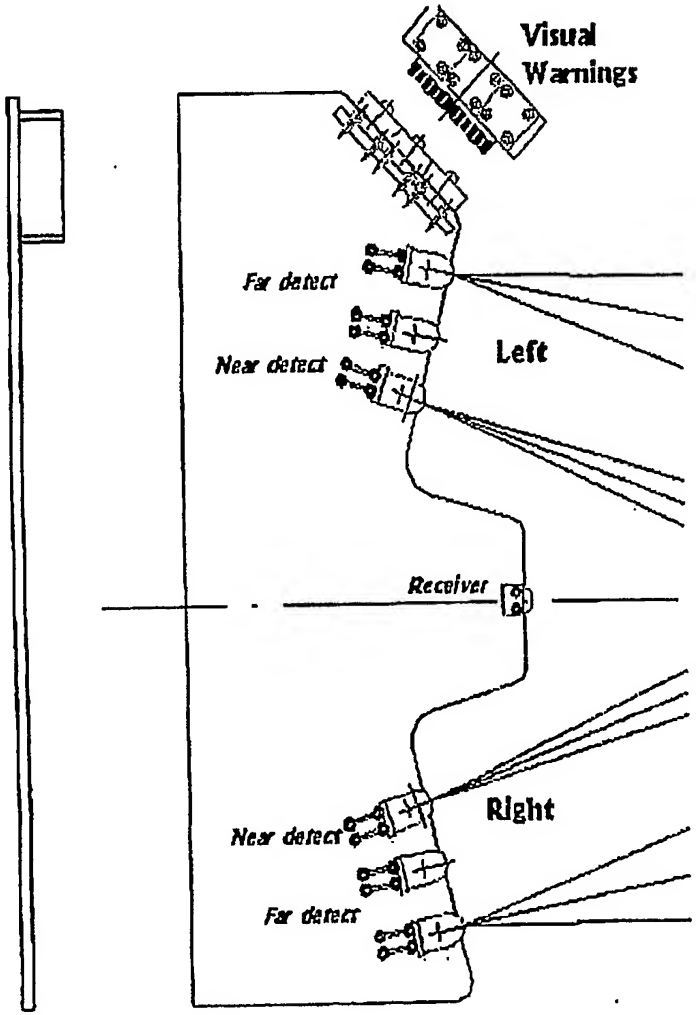


Working principle



- Detects static and dynamic objects.
- With this system we can distinguish from objects moving forward and backwards.

Working principle



- Structures of two groups of LED's work in an alternate way (first we check the left side, after the right one)
- Each set of emitters is composed by two blocks One group for the detection of the far away field view and the other for the short area.

Performance & Technology

- Detection area 4 X 4 m (Blind spot)
- Modular structure of groups of LED's IR

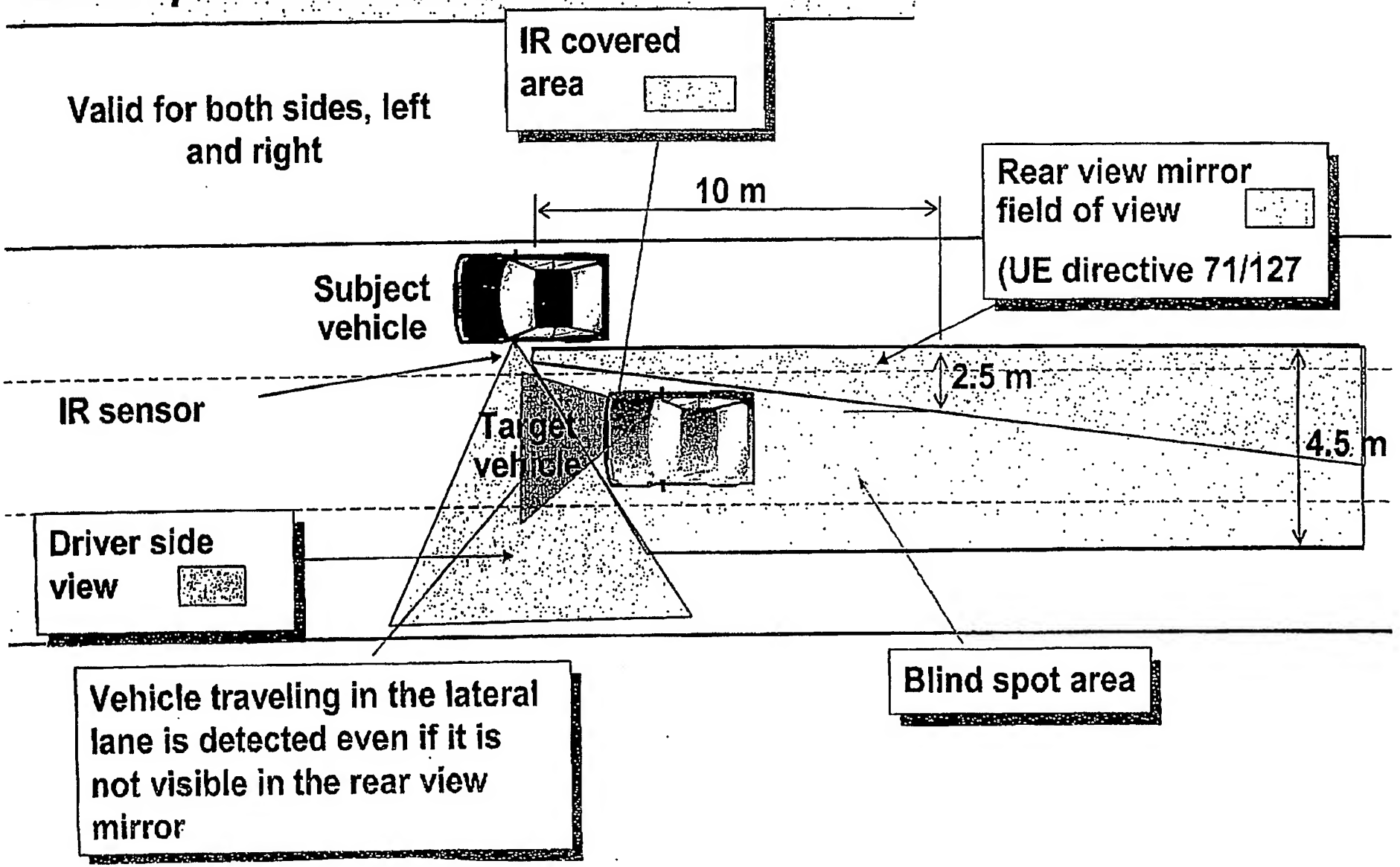
  No harmful (≠ LASER IR: Systems with this type of technology in specific situations can damage the eye-retina.)

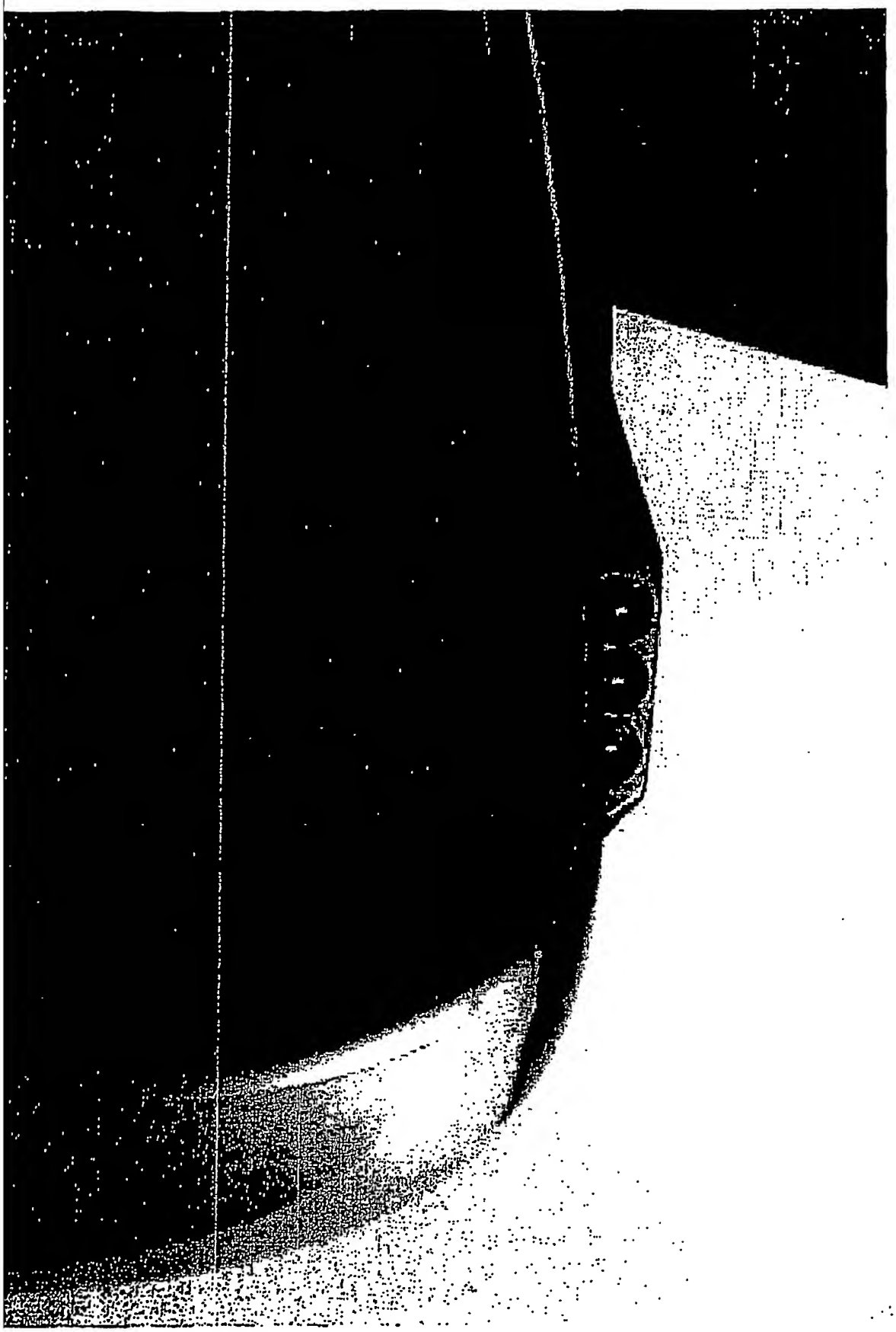
  System detects static and dynamic objects.
- Activation with the turn signal only is configurable.

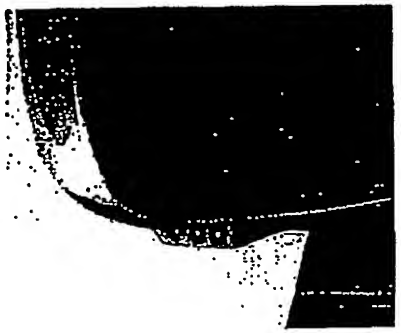
System Advantages

- Detection of vehicles in the Blind Spot area.
- Low cost blind spot detector.
- Easy integration in a rear view mirror.
- Design flexibility for mirror design due to the modular and small structure.
- Works for both sides (using left and right detectors).

Blind spot area and vision areas







B.S.D.

Introduction

- B.S.D. Stands for **Blind Spot Detector.**
- The subsequent presentation will high light the following topics:

  - Defining the Blind Spot
  - Statistics concerning accidents caused by impacts from behind, most commonly by lack of vision in the "Dead Angle" or "Blind Spot".
  - Course of events in accidents caused by impact from behind.
  - The perception capacity and interpretation of situations in human behavior.
  - Problem definition.
  - The B.S.D. solution

Defining the Blind Spot

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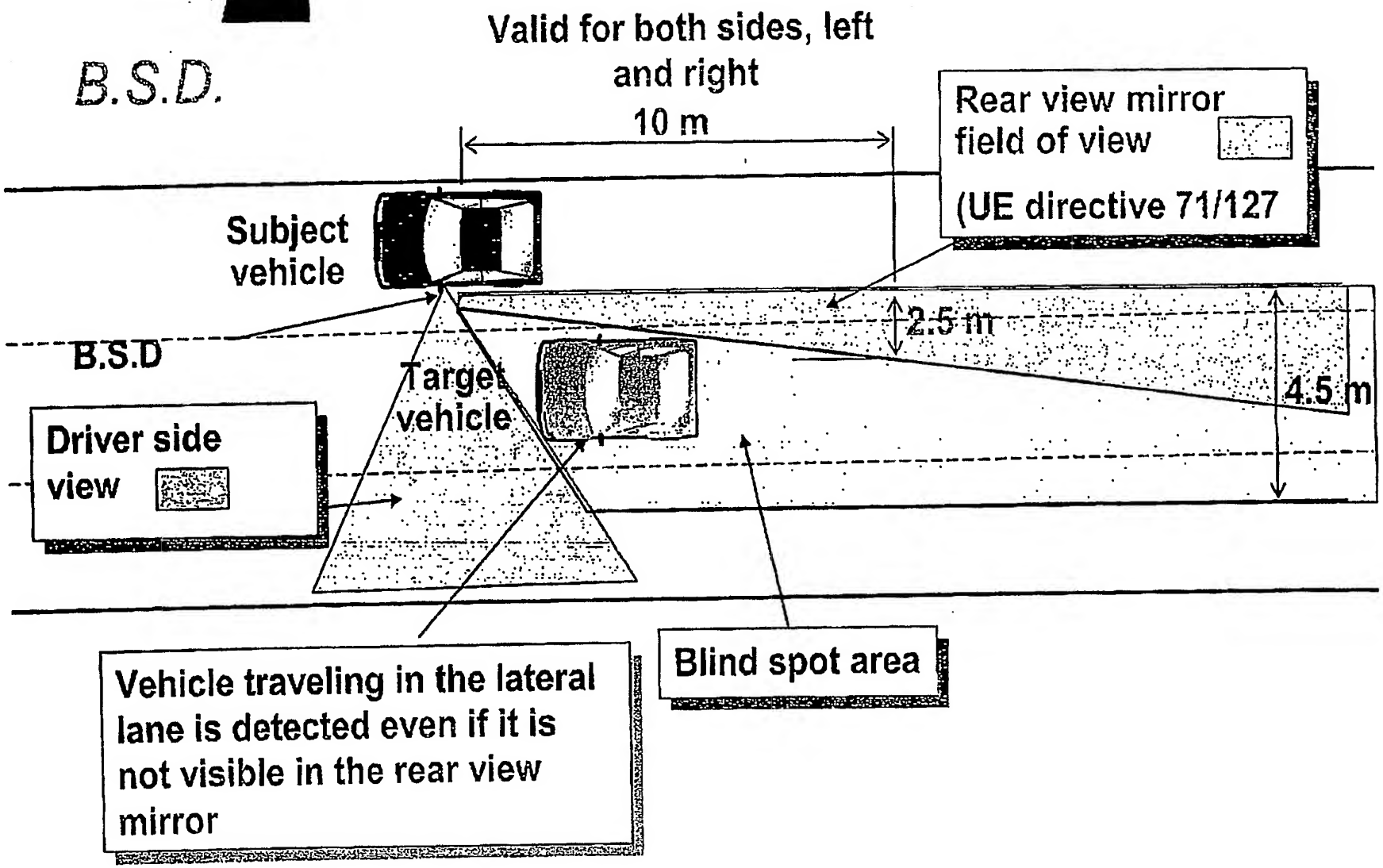

Problem discussion

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Statistics show that approximately 20% of accidents are related to lack of vision in the "Dead Angle" or "Blind Spot"

This means that approximately 800.000 Accidents in the western world are related to this cause every year.

- The impact diagonally from behind and by surprise, causes serious damage to the passengers in the cars involved.

  The lack of vision in the "Dead Angle" or Blind Spot is a serious traffic and security problem, which up to date has not presented a technically satisfactory solution.

- The B.S.D, presents a solution that definitely gives a secure and precise warning device to the driver for perception of other vehicles in the Blind Spot and by that avoiding accidents.

Course of events

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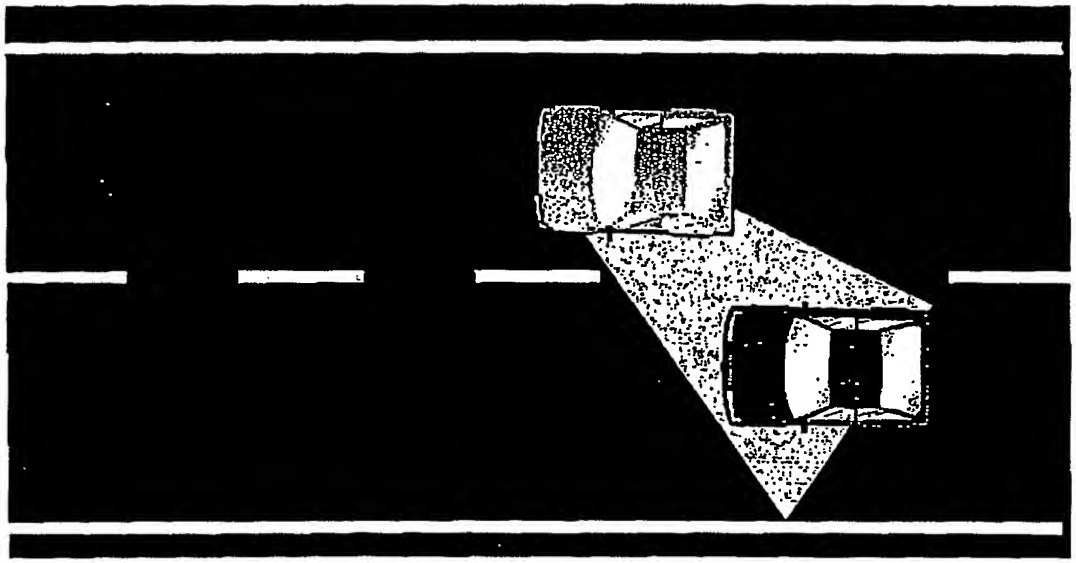
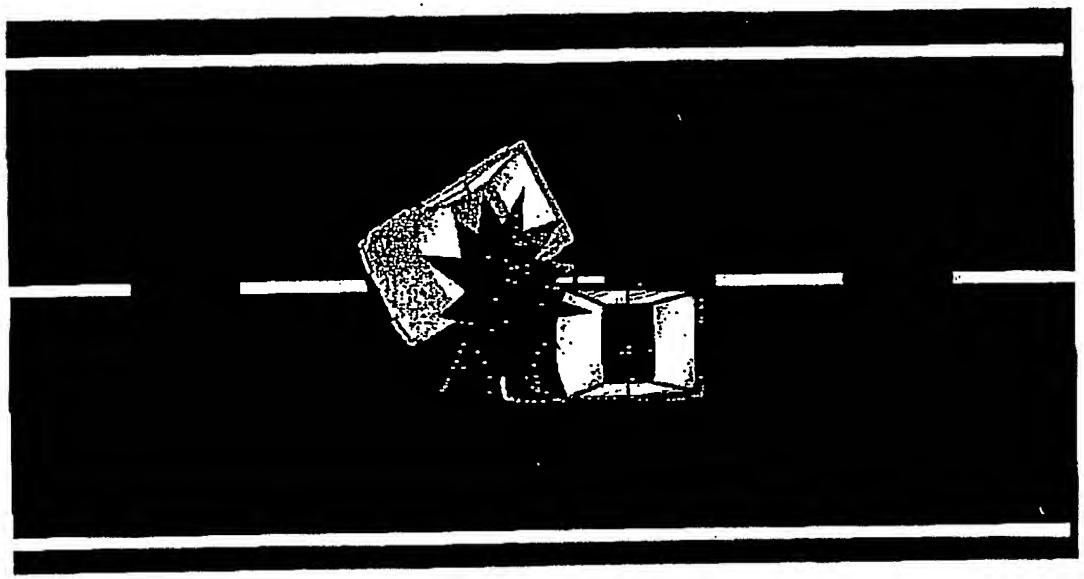


A vehicle approaches from behind and is situated in the Blind spot of the vehicle just about to change lane

Course of events

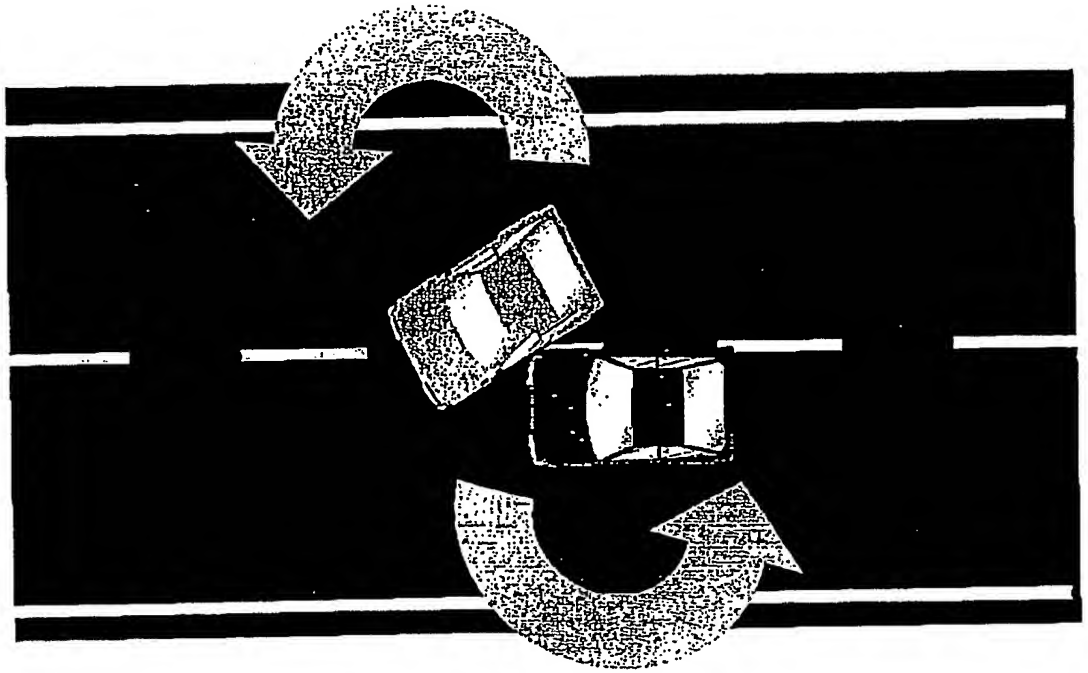
B.S.D.



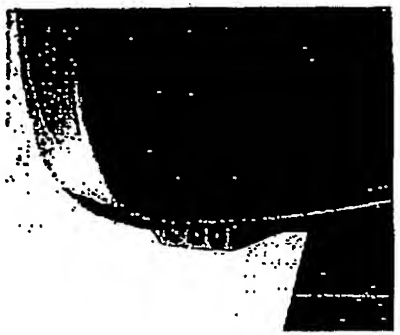
The vehicle changing lanes receives an impact, as it is changing lanes.

Course of events

B.S.D.

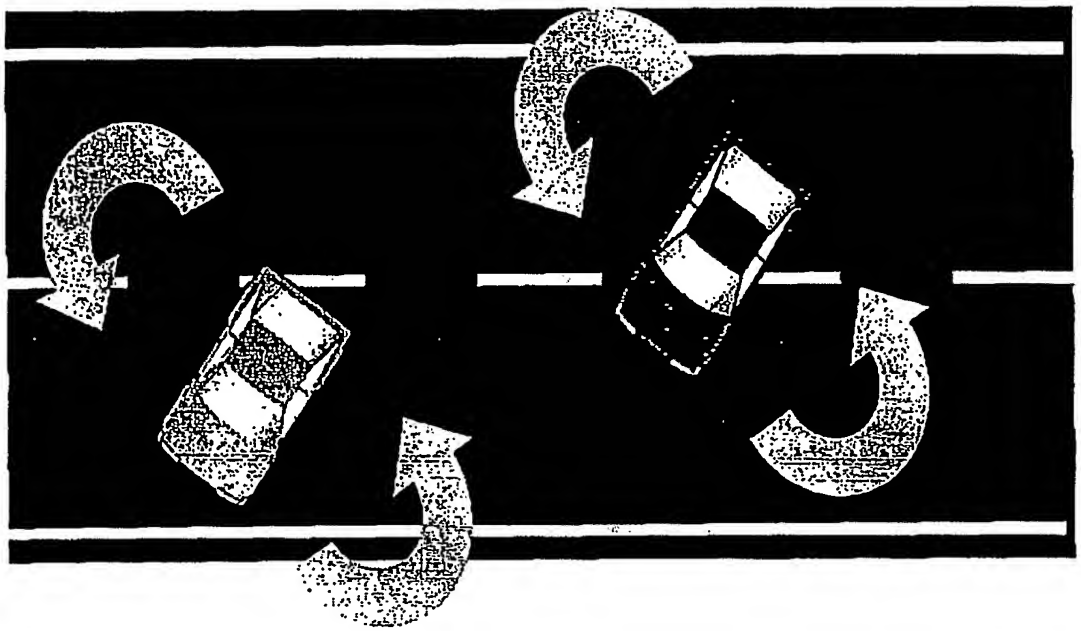


The impact causes a rotating momentum for both cars.

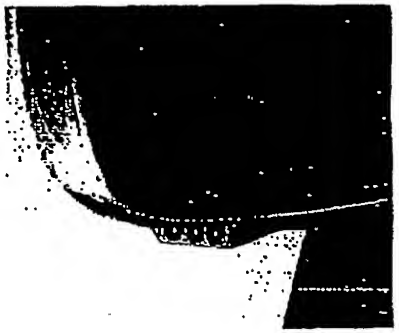


Course of events

B.S.D.

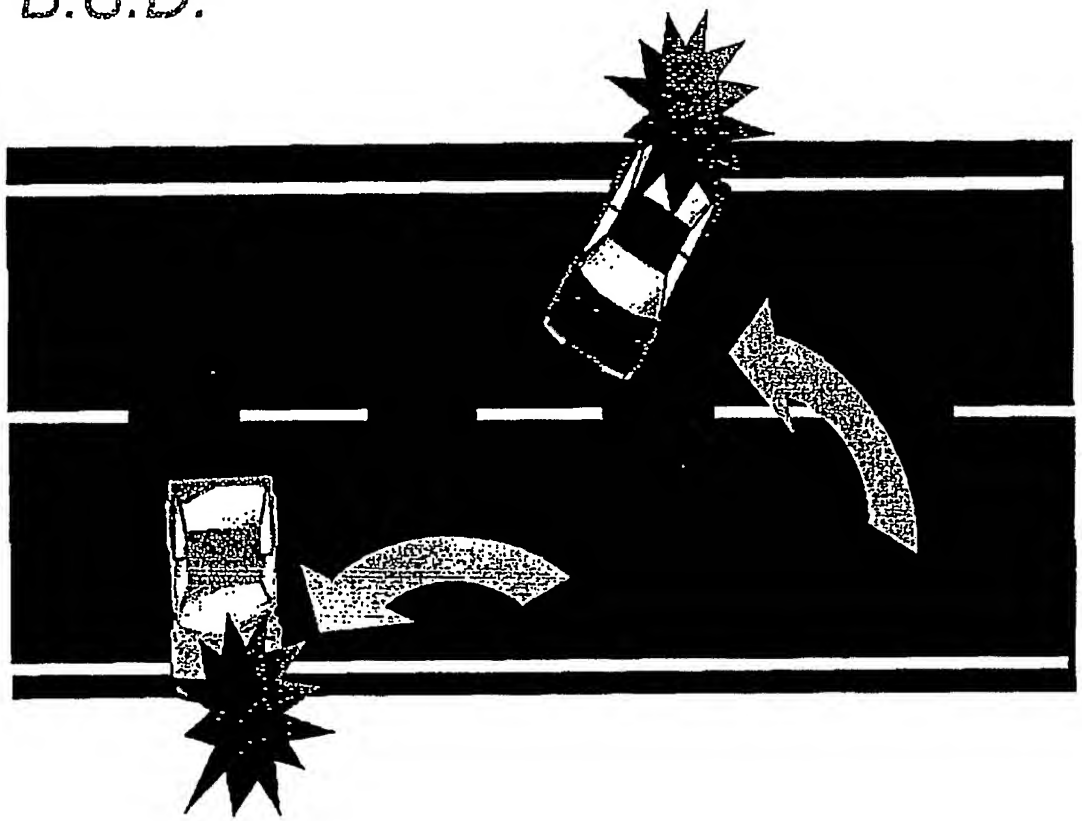


Passengers inside the cars are exposed to strong spiral forces with high risk of eliminating the protection of seatbelts and airbags.

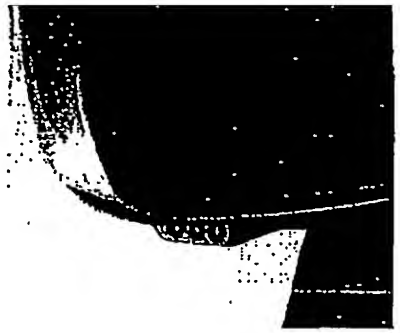


Course of events

B.S.D.



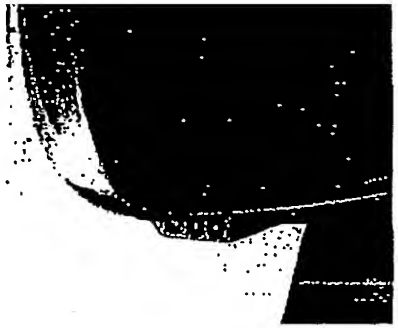
Consequently, passengers are left with little or no protection in subsequent impacts



Summary Course of Events.

B.S.D.

- The course of events, when a vehicle is impacted from behind, laterally or diagonally from behind is often causing serious damage for the passengers.
- These types of impacts cause normally a rotation movement which in its turn often dislocates the driver and passengers from their normal position in the seats and hence diminishes effects from seat-belts and airbags.
- This leads to risks for severe damage and high risks for disabilities and paralysis.

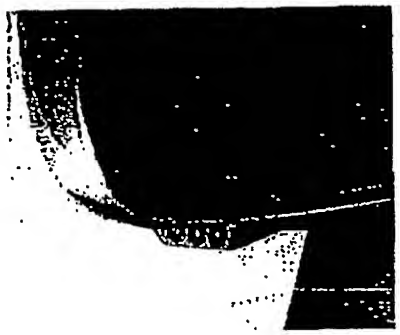


Driver Behaviour

B.S.D.

"The car is amazing in the sense that a technically advanced machine can be dominated and driven by a person without any technical knowledge"
Pehr G. Gyllenhammar Ex. President VOLVO.

- This statement emphasizes that a car must be equipped in a way so that "normal" people can handle the car and the traffic situation.
- Dense and intensive traffic puts a lot of pressure on the driver. Traffic situations are increasing stress levels and give very little time to contemplate a decision.
- There is practically a need for 360 degrees vision to avoid accidents or tricky situations and thus safe driving.



Driver Behaviour

B.S.D.

- Much has been done over the years to improve the range of vision for the driver
- The Blind Spot or the dead angle is although still a problem.
- Solutions presented up till now have not achieved a clear cut aid for specific detection of other vehicles in the Blind Spot.
- Some solutions are also technically too complicated and hence too expensive to be attached as a feature on standard vehicles.
- Spherical mirrors or divided mirrors have not given the desired results either.

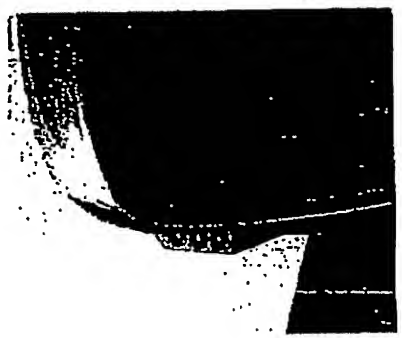
Driver Behaviour

B.S.D.

- When addressing the issue of Blind Spot detection it is very important to take into consideration the human capacity of perception and interpretation of an image in a question of instants.

- The image or traffic scenario perceived with a glimpse in the rear mirrors must be clear and not exposed to second thoughts, doubts or interpretation problems.

- A warning should hence **only** comprise what is not seen or perceived at longer distance in the mirror. An overlapping, interfering or unclear information will only confuse, cause doubts and eventually an erratic maneuver by the driver. E.g. two images of the same vehicle,



Driver Behaviour

B.S.D.

- A device that gives warning signals for vehicles clearly seen in the rear mirror, will eventually on one hand create false positives. The driver believes that the vehicle(s) seen in the mirror are causing the alarm, while an unseen vehicle is located in the Blind Spot.

- On the other hand there is a risk that a device with longer detection area will diminish the frequency of looking in the mirrors, since drivers eventually will rely on the warning device. **A warning device should not replace frequent looks in the mirror.** This will increase risks and deteriorate traffic security rather than improve security.

- The B.S.D. Invention team have then reach the conclusion that a Blind Spot Warning Device should be strictly limited to the Blind Spot and its nearest area in order to fulfil the requirement of a safety device.

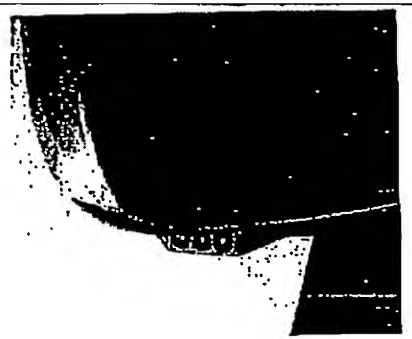
Main features

B.S.D.

- Uncomplicated technique with low risk of failure
- Easy to adapt in different mirror housings
- Low cost
- Clear cut detection in the Blind Spot.

  No false positives.
- No doubtful images.
- Instant warning.

  Simple function with a clear simple message: *WARNING! There is something in the Blind Spot, DO NOT TURN!*
- Prototypes tested with excellent results



Magnitude of the Problem.

B.S.D.

- Specific statistics on Blind Spot related accidents does not exist in official statistics.
- By cross analyzing available statistics it is although fair to assume that approximately 20% of accidents involving personal injury are related to the Blind Spot.
- This means that approximately 250.000 accidents per annum in the EU are related to the Blind Spot.
- This figure extrapolated to the rest of the western world and Japan would give an approximate 800.000 accidents related to the Blind Spot

Market highlights

B.S.D.

- The B.S.D. system is a supplementary system that is not interfering with other security systems and therefore it has a straight and clear cut market message as safety device.

- Blind Spot detection through a simple and well working system like B.S.D. Will eventually by a safety standard on cars, trucks and buses.

- Authorities will support a security system that can help bring down the high cost for society for the complicated injuries that often occur as a result of accidents caused by impacts from behind or diagonally from behind.

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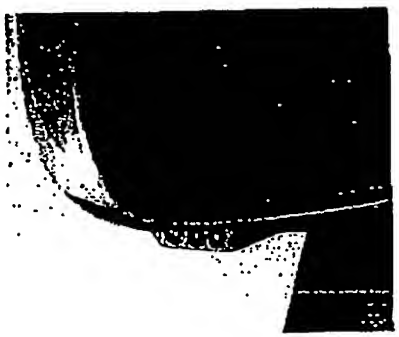

Market highlights (cont.)

B.S.D.

The B.S.D. system is a **preventive** safety approach to car safety in order to **avoid** accidents, while most safety features on cars are approaching safety in case of an accident.

The B.S.D. system is based on human behavior science and a health care vision adapted to car technology.

B.S.D.

Patent status for related applications

- Swedish Paten no. 520 360 approved with validity since 1999 12 15
- PCT Application PCT/SE00/02564 with priority date 1999 12 15 and favorable dictation as a result of International Preliminary Examination Report.
- Applications filed in 19 countries including USA (US 2003/0052773A1), Japan, Brazil, South Korea, Argentina and others. Priority date 19991215

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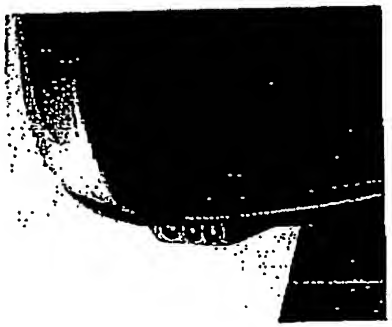


B.S.D.

Technology status and implementation timing

- The B.S.D. device is developed including working prototypes. Drawing material as to technical solutions are available.

- The implementation is hence more rapid than starting the technical development from scratch. A realistic estimation is that 3-4 years of development work is saved.

- The conclusion is that the device could be implemented in 2005-2006 models if implementation work starts as from 2003.

EMISSION PROTOCOL

The system has two microprocessors, one for the emission part (PIC 16C54), and the other one for the detection part, to check the messages, signals enables, and alarms activation (PIC 16C83) that it will be the master. It is needed a good logic communication between the two microprocessors, so it must define the protocol to do the communication.

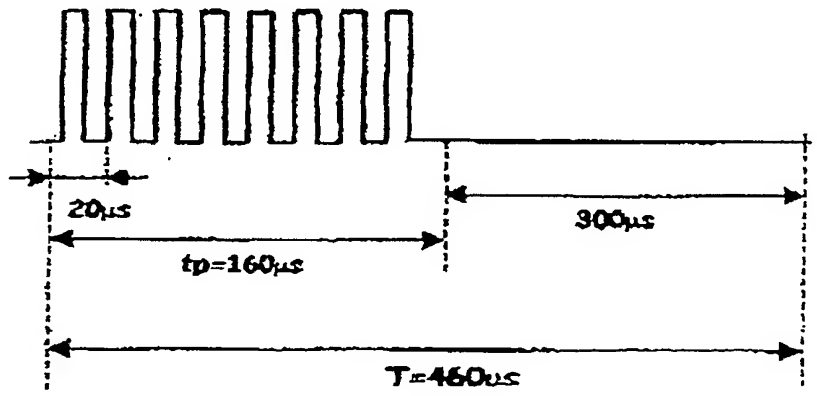
The communication between the µC's will be in parallel. The sequence to emit has 4 bits and they will be transmitted through the PortB in the main µC.

Every time that the emitter emit a message, the emission µC will send to the main µC one signal to indicate the end of the emission. Then the main µC will give the order to change to the other emitter and will send a new sequence to emit. With this all the orders are centralised in the main µC, having it always the control of all what is happening.

The main µC will be working until it detects an interrupt generated by the capture module (this implicates that there are some detection), and then the µC will go to do the detection routine, checking if there are any object in the detection area and enabling the corresponding alarms.

PROTOCOL AND TIME OF EMISSION

The protocol has been defined in accordance with the behaviour and response of the IR receiver U2538 of Temic. So every emission is defined as follows:



Then it has to do combinations of this signal to define the high state signal "1" and the low state signal "0". After all of this, we have defined the low state signal like one emission plus zeros during the same time that one emission, and the high state signal like one emission plus another emission.

So the signals of every level (high or low) are as follows:

Low state ("0")

High state ("1")

It can see that every emission has duration of 460 µs, but every bit has duration of 920 µs because every bit is composed by two emissions. Every message emitted by one emitter has 4bits* 920µs = 3.68ms.

Every message is sent one time by one emitter and after the µC will generate another random sequence to send another message by the second emitter. Once the two emitters have sent a message, it will have been scanned the detection area (blind spot area). So the total duration of one complete scanned is 2 messages* 3.68ms = 7.36ms.

The correct emission and detection of the first emitter and the second emitter at the same time form one complete message. One complete message has duration of 10ms, after this time the µC is already emitting a new message (now scanned). The scanned frequency defined is 100 scans in one second.

ACTIVATION TIMES OF THE DIFFERENT KINDS OF ALARMS

Here are defined the times which have to wait to the alarms activation when the detection messages are correct.

The WARNING will activate after it receives one complete message OK.

Once the WARNING is activated and the corresponding signals enable are detected, it will be activated the corresponding level of the DANGER (after 3 continuous WARNINGS).

All the alarms are kept activates during a time of 2s since they are activated, and after if there is not any other correct detection they will disable.

Claims:

1. A blind spot detector transmitting a sequence of transmissions of IR signals, the signals are transmitted in sequences alternating between a right and to the left positioned LED, If both signals provide a return/reflected signal to the receiver an object such as a vehicle is determined as present behind the point where the transmitted signals intersect/cross, i.e., the blind spot area, whereby the sequencing of signals makes it possible to position a return signal from an object or vehicle, as one of the signals has to confirm the other signal to provide a warning signal.

2. A detector according to claim 1, wherein a microprocessor determines whether or not a received signal should trigger a warning signal, thus in order to trigger a warning signal, both the confirming signals/light beams must be reflected by the same object. Hence, the microprocessor is sorting out all fake/false positive signals/beams, i.e., return signals to the receiver, which signals are not confirmed by an intersecting or crossing signal.

3. A detector according to claim 2, wherein the functioning of the microprocessor can be multiplied to a number of pairs of LED's and by programming the microprocessor the sequencing of multiple search fields can be determined.

4. A detector according to claim 2, wherein, provided through the microprocessor, there are functions such as an interface/connection to direction indicators, speed of the vehicle, wheel angle of the vehicle and other functions to optimize the functionality of the blind spot detector warning device of the present invention.

5. A detector according to claim 3, wherein the width of a search field is determined by the optics of the LED's utilized, through the sector angle within a beam of light and the angle between beams of light, and through the power of transmission of a transmitted IR signal.

6. A detector according to claim 3, wherein search fields can be arranged so that warning signals are provided when a vehicle is entering the blind spot area, is within the area, and is leaving the area.

7. A detector according to claim 1, wherein multiple pairs of LED's can be utilized depending on the number of search fields in the blind spot area. For example, one search field can have a distance for searching of 2-4 meters, another, a distance of 4-8 meters and so on.

8. A detector according to claim 1, wherein by sunshine a strong signal is utilized and during darkness a weaker signal, which provides that the signal strength is adapted to the external light conditions.

9. A detector according to claim 8, wherein the LED's become dirty, the blind spot detector can regulate/adapt the signal strength to such conditions.

10. A method for a blind spot detector transmitting a sequence of transmissions of IR signals, the signals are transmitted in sequences alternating between a right and to the left positioned LED, If both signals provide a return/reflected signal to the receiver an object such as a vehicle is determined as present behind the point where the transmitted signals intersect/cross, i.e., the blind spot area, whereby the sequencing of signals makes it possible to position a return signal from an object or vehicle, as one of the signals has to confirm the other signal to provide a warning signal.

11. A method according to claim 10, wherein a microprocessor determines whether or not a received signal should trigger a warning signal, thus in order to trigger a warning signal, both the confirming signals/light beams must be reflected by the same object. Hence, the microprocessor is sorting out all fake/false positive signals/beams, i.e., return signals to the receiver, which signals are not confirmed by an intersecting or crossing signal.

12. A method according to claim 11, wherein the functioning of the microprocessor can be multiplied to a number of pairs of LED's and by programming the microprocessor the sequencing of multiple search fields can be determined.

13. A method according to claim 11, wherein, provided through the microprocessor, there are functions such as an interface/connection to direction indicators, speed of the vehicle, wheel angle of the vehicle and other functions to optimize the functionality of the blind spot detector warning device of the present invention.

14. A method according to claim 12, wherein the width of a search field is determined by the optics of the LED's utilized, through the sector angle within a beam of light and the angle between beams of light, and through the power of transmission of a transmitted IR signal.

15. A method according to claim 12, wherein search fields can be arranged so that warning signals are provided when a vehicle is entering the blind spot area, is within the area, and is leaving the area.

16. A method according to claim 10, wherein multiple pairs of LED's can be utilized depending on the number of search fields in the blind spot area. For example, one search field can have a distance for searching of 2-4 meters, another, a distance of 4-8 meters and so on.

17. A method according to claim 10, wherein by sunshine a strong signal is utilized and during darkness a weaker signal, which provides that the signal strength is adapted to the external light conditions.

18. A method according to claim 17, wherein the LED's become dirty, the blind spot detector can regulate/adapt the signal strength to such conditions.

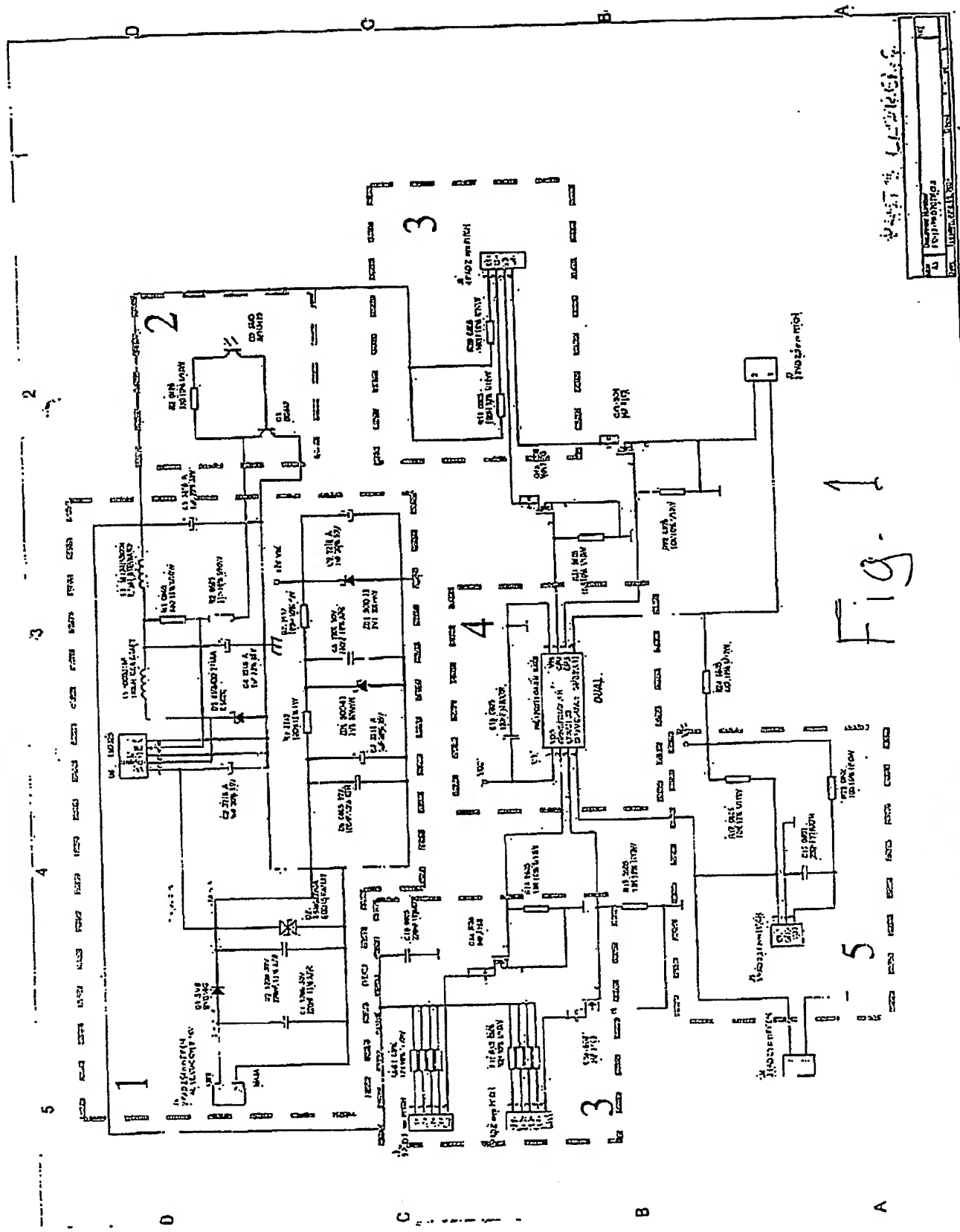


Fig. 1